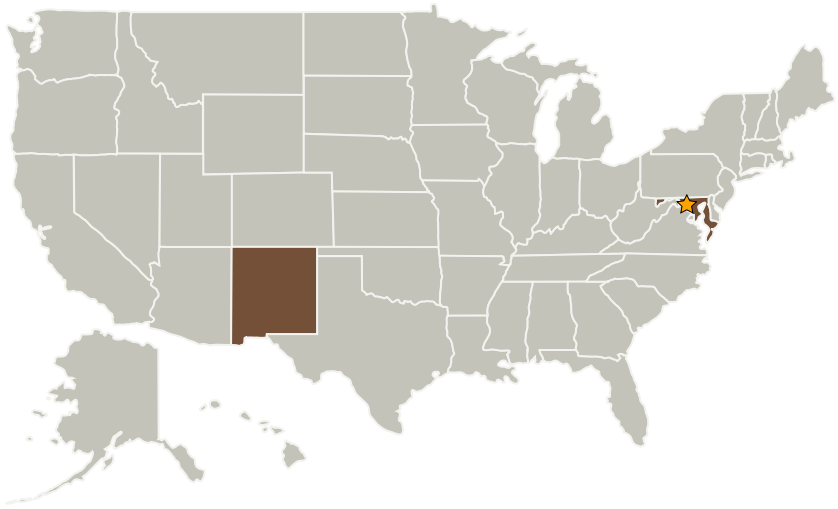
Superconducting Tunnel Junction Arrays for UV Photon Detection, Phase I

Completed Technology Project (2005 - 2005)

Project Introduction

An innovative method is described for the fabrication of superconducting tunnel junction (STJ) detector arrays offering true "three dimensional" imaging throughout the UV, visible and near-IR spectrum. Current state-of-the-art STJ detectors are fabricated from thin epitaxial Ta films that must be deposited at high temperatures on sapphire substrates. The subsequent metal films necessary to complete the STJ may be deposited at ambient temperature, but all of these films must be deposited uniformly with low stress and tight thickness control if acceptable device yields are to be achieved. We propose to develop a reliable and reproducible Ta STJ fabrication process using an advanced thin-film deposition tool that features a precision backside heater for reproducible depositions of high-quality epitaxial films and computer-controlled deposition modes that ensure excellent reproducibility and film uniformity (better than 98%) across an entire wafer. The combination of these unique deposition features is essential for the reproducible fabrication of reliable STJ detector arrays with uniform device properties and high production yields.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
STAR Cryoelectronics, LLC	Supporting Organization	Industry	Santa Fe, New Mexico

Primary U.S. Work Locations	
Maryland	New Mexico

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robin H Cantor

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes